Optical Lightning Detection and and Vector Electric Field Measurements Gathered in the Low-Latitude Ionosphere by Probes on the C/NOFS Satellite

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The Air Force Communication/Navigation Outage Forecast System (C/NOFS) satellite has, for the first time, successfully lofted both a DC-VLF vector electric field instrument and a pair of optical lightning sensors into the low latitude ionosphere in order to study these transients and their space weather effects. Because the C/NOFS orbit is near equatorial (+/- 13 degrees inclination), every single pass traverses dozens of lightning-producing storms, most notably in Africa, South America, and the South Pacific. This paper will describe lightning-induced electric field and optical transient measurements and provide an overview of the new results regarding lightning energy input into the ionosphere as well as their lightning-induced ionospheric irregularities. In addition, we couple the in situ measured electric field and optical waveforms with ground-based lightning location information provided by the World-Wide Lightning Location Network (WWLLN) in order to study the full propagation of the lightning electromagnetic pulse (EMP) from the source to the satellite location in the ionosphere.

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